

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference F14570IN	FOR FURTHER ACTION		see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, Item 5 below.
International application No. PCT/IB 99/ 01568	International filing date (day/month/year) 22/09/1999	(Earliest) Priority Date (day/month/year) 09/10/1998	
Applicant TRICO PRODUCTS CORPORATION et al.			

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:

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☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

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2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

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6. The figure of the drawings to be published with the abstract is Figure N .

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1
☐ None of the figures.

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INTERNATIONAL SEARCH REPORT

International Application No.

PCT/IB 99/01568

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 B60S1/38

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IPC 7 B60S

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

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☒ Further documents are listed in the continuation of box C.

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6 December 1999

Date of mailing of the international search report

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Name and mailing address of the ISA

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US 3192551	A	06-07-1965	NONE	

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XP-002124773

PT 4984
P 60-61 = 2

11 Properties of Metallic Solids (at 293 K)

60

Values quoted for Tensile Strength and Yield Stress are in units of 10^6 N m^{-2} (= MPa). Values of Young's Modulus are in units of 10^9 N m^{-2} (= GPa). These values are typical observations and are approximate only. The elastic properties vary somewhat between specimens depending on the manufacturing process and the previous history of the sample. The Shear Modulus (G) and Bulk Modulus (K) can be calculated from the relations: $G = \frac{1}{2}E/(1 + \nu)$ and $K = \frac{1}{3}E/(1 - 2\nu)$, where E is Young's Modulus and ν is Poisson's Ratio.

Name	Density $\rho/\text{kg m}^{-3}$	Melting Point T_m/K	Specific Latent Heat of Fusion $L_f/\text{J kg}^{-1}$ $\times 10^4$	Specific Heat Capacity $c_p/\text{J kg}^{-1} \text{K}^{-1}$	Linear Expansivity α/K^{-1} $\times 10^{-6}$	Thermal Conductivity $\lambda/\text{W m}^{-1} \text{K}^{-1}$	Electrical Resistivity $\rho/\Omega \text{m}$ $\times 10^{-8}$	Temperature Coefficient of Resistance $(1/\rho_0)(d\rho/dT)/\text{K}^{-1}$ $\times 10^{-4}$	Tensile Strength σ_T/MPa	Yield Strength σ_Y/MPa	Elongation $\epsilon/\%$	Young's Modulus E/GPa	Poisson's Ratio ν	
1 Aluminium	2 710	932	38	913	23	201	2.65	40	80	50	43	71	0.34	1
2 Aluminium, strong alloy	2 800	800	39	880	23	180	5	16	600	550	10	71	0.34	2
3 Antimony	6 680	904	16	205	10	18	40	~ 50				78		3
4 Bismuth	9 800	544	5	126	13	8	115	45				32	0.33	4
5 Brass (70Cu/30Zn)	8 500	1300		370	18	110	~ 8	~ 15	550	450	8	100	0.35	5
6 Bronze (90Cu/10Sn)	8 800	1300		360	17	180	30		260	140	10			6
7 Cobalt	8 900	1765	25	420	12	69	6	66	~ 500					7
8 Constantan	8 880	1360		420	17	23	47	± 0.4				170	0.33	8
9 Copper	8 930	1356	21	385	17	385	1.7	39	150	75	45	117	0.35	9
10 German silver (60Cu/25Zn/15Ni)	8 700	1300		400	18	29	33	4	450			130	0.33	10
11 Gold	19 300	1340	7	132	14	296	2.4	34	120		40	71	0.44	11
12 Invar (64Fe/36Ni)	8 000	1800		503	0.9	16	81	20	480	280	40	145	0.26	12
13 Iron, pure	7 870	1810	27	106	12	80	10	65	300	165	45	206	0.29	13
14 Iron, cast grey	7 150	1500	10	500	11	75	10		100			110	0.27	14
15 white	7 700	1420	14		11	75	10		230		~ 0			15
16 wrought	7 850	1810	14	480	12	60	14	60	~ 370	150	45	197	0.28	16
17 Lead	11 340	600	2.6	126	29	35	21	43	15	12	50	18	0.44	17
18 Magnesium	1 740	924	38	246	25	150	4	43	190	95	5	44	0.29	18
19 Manganin	8 500		41	400	18	22	45	± 0.1				120	0.33	19
20 Monel (70Ni/30Cu)	8 800	1600			14	210	42	20	520	240	40			20
21 Nickel	8 900	1726	31	460	13	59	59	60	300	60	30	207	0.36	21
22 Nickel, strong alloy	8 500	1320		380					1300	1200	10	110	0.38	22
23 Phosphor bronze					17		7	60	560	420		120	0.38	23
24 Platinum	21 450	2042	11	136	9	69	11	38	350			150	0.38	24
25 Silver	10 500	1230	10	235	19	419	1.6	40	150	180	45	70	0.37	25
26 Sodium	970	371	12	1240	71	134	4.5	44						26
27 Solder, soft (50Pb/50Sn)	9 000	490	190	176					45		50			27
28 Stainless Steel (18Cr/8Ni)	7 930	1800		510	16	150	96	6	600	230	60			28
29 Steel, mild	7 860	1700		420	15	63	15	50	460	300	35	210	0.29	29
30 Steel, piano wire	7 800	1700				50			3000			210	0.29	30
31 Tin	7 300	505	6.0	226	23	65	11	50	30			40	0.36	31
32 Titanium	4 540	1950		523	9	23	53	38	620	480	20		0.36	32
33 Zinc	7 140	693	10	385	31	111	5.9	40	150		50	110	0.25	33

12 Properties of Non-Metallic Solids (at 293 K)

61

The following table lists materials which do not readily conduct electricity. In many cases the physical constants cannot be specified accurately as the values observed depend so much on the manufacture and life history of the specimen. The values given are to be taken as representative only.

Name	Density $\rho/\text{kg m}^{-3}$	Melting Point T_m/K	Specific Heat Capacity $c_p/\text{J kg}^{-1} \text{K}^{-1}$	Linear Expansivity α/K^{-1} $\times 10^{-6}$	Thermal Conductivity $\lambda/\text{W m}^{-1} \text{K}^{-1}$	Tensile Strength σ_T/MPa	Elongation $\epsilon/\%$	Young's Modulus E/GPa	
1 Alumina, ceramic	3 800	2300	800	9	29	~ 150		345	1
2 Bone	1 850					140		28	2
3 Brick, building	2 300			9	0.6	~ 5			3
4 fireclay	2 100			4.5	0.8				4
5 paving	2 500			4.0					5
6 silica	1 750				0.8				6
7 Carbon, graphite	2 300	3800	710	7.9	5.0			207	7
8 diamond	3 300		525	~ 0	900			1200	8
9 Concrete	2 400		3350	12	0.1	~ 4		14	9
10 Cork	240		2050		0.05				10
11 Cotton	1 500		1400			400			11
12 Epoxy resin	1 120		1400	39		50	2-6	4.5	12
13 Fluon (PTFE)	2 200		1050	55	0.25	22	50-75	0.34	13
14 Glass (crown)	2 600	1400	670	9	1.0	~ 100		71	14
15 (flint)	4 200	1500	500	8	0.8			80	15
16 Glass wool	50	1400	670		0.04				16
17 Ice	920	273	2100	51	2.0				17
18 Kapok	50				0.03				18
19 Magnesium oxide	3 600	3200	960	12				207	19
20 Marble	2 600		880	10	2.9				20
21 Melamine formaldehyde	1 500		1700	40	0.3	70		9	21
22 Naphthalene	1 150	350	1310	107	0.4				22
23 Nylon	1 150	470	1700	100	0.25	70	60-300		23
24 Paraffin wax	900	330	2900	110	0.25				24
25 Perspex	1 190	350	1500	85	0.2	50	2-7	3	25
26 Phenol formaldehyde	1 300		1700	40	0.2	50	0.4-0.8	6.9	26
27 Polyethylene (low den)	920	410	2300	250		13	400-800	0.18	27
28 (high den)	955	410	2300	250		26	100-300	0.43	28
29 Polypropylene	900	450	2100	62		35	> 220	1.2	29
30 Polystyrene	1 050	510	1300	70	0.08	50	1-3	3.1	30
31 Polyvinylchloride (non-rigid)	1 250	485	1800	150		15	200-400	0.01	31
(rigid)	1 700	485	1000	55		60	5-25	2.8	32
33 Polyvinylidene chloride		470		190		30	160-240		33
34 Quartz fibre	2 660	2020	788	0.4	9.2			73	34
35 Rubber (polyisoprene)	910	300	1600	220	0.15	17	480-510	0.02	35
36 Silicon carbide	3 170			4.5					36
37 Sulphur	2 070	386	730	64	0.26				37
38 Titanium carbide	4 500			7	28			345	38
39 Wood, oak (with grain)	650				0.15			12	39
40 .. Spruce (with grain)	600							14	40
41 .. Spruce (across grain)								0.5	41

INTERNATIONAL SEARCH REPORT

onal Application No

PCT/IB 99/01568

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B60S1/38

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Name and mailing address of the ISA

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			DE 59003722 D	13-01-1994
			EP 0498802 A	19-08-1992
			ES 2047343 T	16-02-1994
			JP 2950982 B	20-09-1999
			JP 5501231 T	11-03-1993
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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference F14570 IN/vd	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/IB99/01568	International filing date (day/month/year) 22/09/1999	Priority date (day/month/year) 09/10/1998
International Patent Classification (IPC) or national classification and IPC B60S1/38		
Applicant TRICO PRODUCTS CORPORATION et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 27/04/2000	Date of completion of this report 04.10.2000
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Durand-Smet, J Telephone No. +49 89 2399 8881 

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**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/IB99/01568

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

2-5 as originally filed

1 as received on 08/09/2000 with letter of 08/09/2000

Claims, No.:

1-12 as received on 08/09/2000 with letter of 08/09/2000

Drawings, sheets:

1/4-4/4 as originally filed

2. The amendments have resulted in the cancellation of:

☐ the description, pages:

☐ the claims, Nos.:

☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

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**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/IB99/01568

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims 1-12
	No: Claims
Inventive step (IS)	Yes: Claims 1-12
	No: Claims
Industrial applicability (IA)	Yes: Claims 1-12
	No: Claims

2. Citations and explanations

see separate sheet

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To item V:

1. The claimed invention refers to a windscreen wiper comprising a backbone in the form of a beam and a rubber wiper blade. Such a windscreen wiper is disclosed e.g. in EP-A-0 528 643, in which
"the width, thickness and radius of curvature also determine other characteristics of the backbone",
see EP-A-0 528 643, page 3, lines 19 to 25.

The present claimed invention seems to be an improvement of such a windscreen wiper and relies

- either on a relationship between the width, the beam material's Young's modulus and the total length of the beam,
- or on a relationship between the thickness, the beam material's Young's modulus and the total length of the beam.

These relationships are expressed in the formulae specified in claims 1 and 2 and in claims 3 and 4 respectively.

2. As there is no suggestion in any of the prior art documents to provide a windscreen wiper of the type disclosed e.g. in EP-A-0 528 643 which would comply with one of these formulae, the subject-matters of the independent claims 1 to 4 seem to be novel and inventive under the terms of article 33 (1) to (3) PCT.
3. Further developments in line with claims 1 and 3 are referred to in the dependent claims 5 to 12. Therefore, therefore, the subject-matter of each of these dependent claims seems also to be novel and inventive under the terms of article 33 (1) and (3) PCT.

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A WINDSCREEN WIPER

(1) *Beam 1st 12*
(2) ~~Beam 1st 12~~

This invention relates to a windscreen wiper, which is also known as a windshield wiper.

(2) *Beam 1st 12*

The invention relates in particular to a windscreen wiper which has a curved backbone and which may have a varying width and/or thickness. It will be appreciated by those skilled in the art that the backbone may be in the form of a beam that is such as in EP-A-0 528 643 and DE-A-196 51229 curved in a plane or may have a compound curvature. The beam will have width and thickness dimensions. The beam will also have a radius of curvature at each point along its length.

The applicant has conducted substantial analysis and experimentation and believes that he has found a relationship between the width, the beam material's Young's modulus and the total length of the beam and the thickness, the beam material's Young's modulus and the total length, which provides a windscreen wiper that operates in an improved manner.

In this specification, the term "spatially consolidated" is to be understood, unless the context clearly indicates otherwise, to mean that the actual perimeters of a cross-section coincides with the shortest possible perimeter encapsulating that cross-section.

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CLAIMS

1. A windscreen wiper (10) which includes

an elongate curved backbone (12) which is of a resiliently flexible material having a Young's modulus of between 50 GPa to 350 GPa, the backbone having a substantially spatially consolidated cross-sectional profile at substantially all points along its length,

characterised therein that the magnitude of the width at substantially the widest point along the backbone, W_m (expressed in millimetres) is at most $(-8.8889 \times 10^{-5} * E + 0.05378) * L^{-5.25}$, where L is the total length of the backbone expressed in millimetres and E is the Young's modulus of the backbone material expressed in GPa.

2. A windscreen wiper (10) which includes

an elongate curved backbone (12) which is of a resiliently flexible material having a Young's modulus of between 50 GPa to 350 GPa, the backbone having a substantially spatially consolidated cross-sectional profile at substantially all points along its length,

characterised therein that the ratio of the magnitude of the width at substantially the widest point along the backbone, to the total length L of the backbone, R_W is at most $(-8.8889 \times 10^{-5} * E + 0.05378) - 5.25/L$, where L is the total length of the backbone expressed in millimetres and E is the Young's modulus of the backbone material expressed in GPa.

3. A windscreen wiper (10) which includes

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an elongate curved backbone (12) which is of a resiliently flexible material having a Young's modulus of between 50 GPa to 350 GPa, the backbone having a substantially spatially consolidated cross-sectional profile at substantially all points along its length,

characterised therein that the magnitude of the thickness at substantially the thickest point along the backbone, T_m (expressed in millimetres) is at most $0.0007 * L - 0.0027407 * E + 1.37814$, where L is the total length of the backbone expressed in millimetres and E is the Young's modulus of the backbone material expressed in GPa.

4. A windscreen wiper (10) which includes

an elongate curved backbone (12) which is of a resiliently flexible material having a Young's modulus of between 50 GPa to 350 GPa, the backbone having a substantially spatially consolidated cross-sectional profile at substantially all points along its length,

characterised therein that the ratio of the magnitude of the thickness at substantially the thickest point along the backbone, to the total length L of the backbone, R_t is at most $0.0007 - (0.0027407 * E + 1.37814)/L$, where L is the total length of the backbone expressed in millimetres and E is the Young's modulus of the backbone material expressed in GPa.

5. The windscreen wiper as claimed in Claim 1, characterised therein that the material of the backbone is a composite material, with the Young's modulus being that of the composite material.

6. The windscreen wiper as claimed in Claim 3, characterised therein that the

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material of the backbone is a composite material, with the Young's modulus being that of the composite material.

7. The windscreen wiper as claimed in Claim 1, characterised therein that the backbone has a varying width and thickness along its length.

8. The windscreen wiper as claimed in Claim 1, characterised therein that the backbone has a free form curvature in a plane.

9. The windscreen wiper as claimed in Claim 1, characterised therein that the backbone has a compound curvature.

10. The windscreen wiper as claimed in Claim 3, characterised therein that the backbone has a varying width and thickness along its length.

11. The windscreen wiper as claimed in Claim 3, characterised therein that the backbone has a free form curvature in a plane.

12. The windscreen wiper as claimed in Claim 3, characterised therein that the backbone has a compound curvature.

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

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Date of submission of the demand 27/04/2000	Date of completion of this report 04.10.2000
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Durand-Smet, J Telephone No. +49 89 2399 8881 

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**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/IB99/01568

I. Basis of the report

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Claims, No.:

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**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/IB99/01568

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-12
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-12
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-12
	No:	Claims	

2. Citations and explanations

see separate sheet

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